SH7145 Group FP-144F
User System Interface Board

HS7145ECH61H User's Manual

Renesas Microcomputer Development Environment System

SuperH™ Family/SH7144 Series

User's Manual

Rev.4.00
2004.1.29

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IMPORTANT INFORMATION

READ FIRST

• READ this user's manual before using this user system interface cable.

• KEEP the user's manual handy for future reference.

Do not attempt to use the user system interface cable until you fully understand its mechanism.

User System Interface Cable:

Throughout this document, the term "user system interface cable" shall be defined as the following product produced only by Renesas Technology Corp. excluding all subsidiary products.

- User system interface cable (HS7145ECH61H)

The user system or a host computer is not included in this definition.

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This user system interface cable should only be used by those who have carefully read and thoroughly understood the information and restrictions contained in the user's manual. Do not attempt to use the user system interface cable until you fully understand its mechanism.

It is highly recommended that first-time users be instructed by users that are well versed in the operation of the user system interface cable.

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Figures:

Some figures in this user's manual may show items different from your actual system.

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Renesas cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the user system interface cable are therefore not all inclusive. Therefore, you must use the user system interface cable safely at your own risk.

SAFETY PAGE

READ FIRST

• READ this user's manual before using this user system interface cable.

• KEEP the user's manual handy for future reference.

Do not attempt to use the user system interface cable until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Do not repair or remodel the emulator product by yourself for electric shock prevention and quality assurance.**
2. **Always switch OFF the E6000H emulator and user system before connecting or disconnecting any CABLES or PARTS.**
3. **Always before connecting any CABLES, make sure that pin 1 on both sides are correctly aligned.**

Preface

The HS7145ECH61H is a user system interface board that connects a user system for the SH7145 FP-144F package to the SH7046 E6000H emulator (HS7046EPH60H).

Contents

Section 1 Configuration 1

Section 2 Environmental Conditions 3
2.1 Setting Operating Voltage and Operating Frequency 3

Section 3 Product Specifications 4
Drop in Vcc Level Detection Function: 4

Section 4 User Interface Specifications 5
4.1 User System Interface Circuit 5

Section 5 Connection Procedures 8
5.1 Connecting User System Interface Board to User System 8
5.1.1 Installing IC Socket 8
5.1.2 Installing Cable Head 9
5.1.3 Fastening Cable Head 9
5.2 Connecting User System Interface Board to EV-Chip Board 11
5.3 Recommended Dimensions for User System Mount Pad (Footprint) 13
5.4 Dimensions for EV-Chip Board and User System Interface Board 14
5.5 Resulting Dimensions after Connecting User System Interface Board 15

Section 6 Installing the MCU to the User System 16

Section 7 Verifying Operation 18

Section 8 Notice 20

Section 1 Configuration

Figure 1 and table 1 show the configuration and components of the user system interface board for the FP-144F package. Please make sure you have all of these components when unpacking.

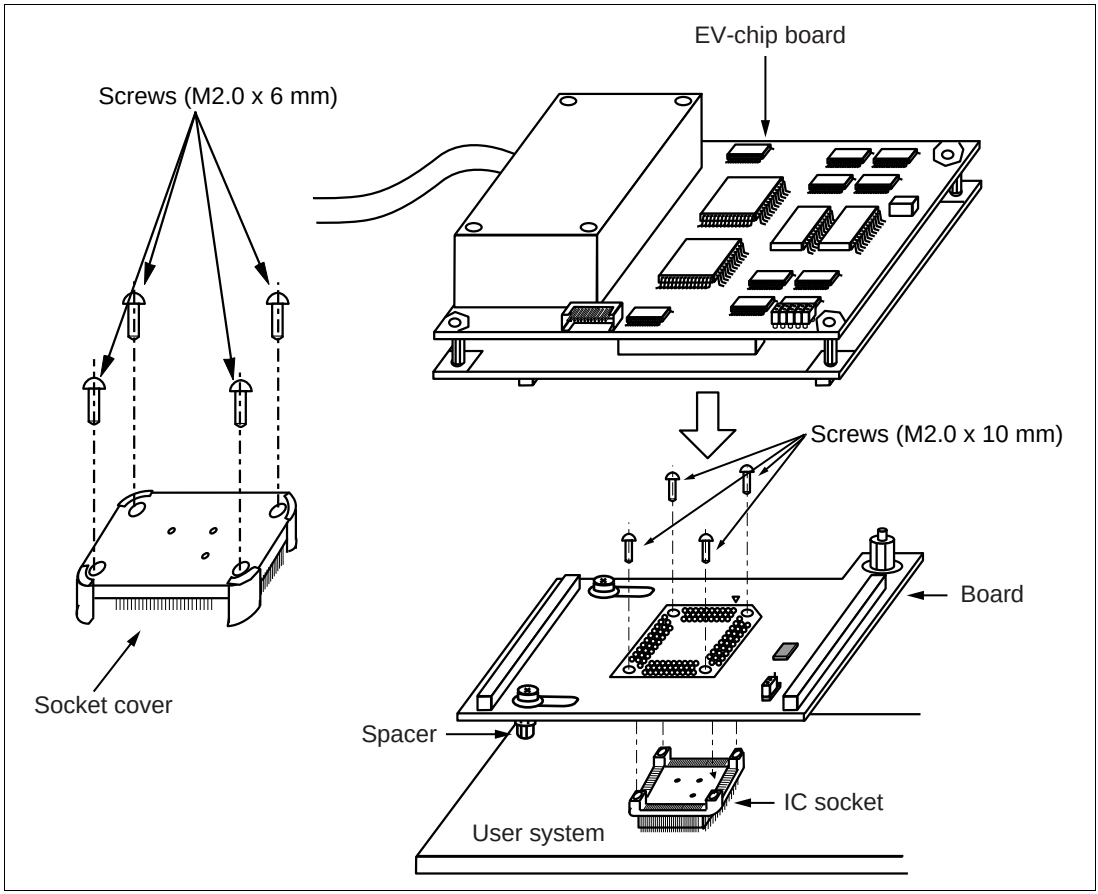


Figure 1 User System Interface Board for the SH7145 FP-144F Package

CAUTION

Use a NQPACK144SD socket (manufactured by Tokyo Eletech Corporation) for the FP-144F package IC socket on the user system.

Table 1 HS7145ECH61H Components

No.	Component	Quantity	Remarks
1	Board	1	With two spacers (2.6MP x 6 mm)
2	IC socket	1	For the FP-144F package (to be mounted on the user system)
3	Socket cover	1	For the FP-144F package (for installing MCU)
4	Screws (M2.0 x 10 mm)	4	For fastening board
5	Screws (M2.0 x 6 mm)	4	For installing an FP-144F-packaged MCU
6	Guide pins	3	
7	Screwdriver	1	
8	User's manual	1	User's manual for HS7145ECH61H (this manual)

Section 2 Environmental Conditions

Maintain the conditions in table 2 when using the emulator.

Table 2 Environmental Conditions

Item	Specifications
Temperature	Operating: +10 to +35°C Storage: -10 to +35°C
Humidity	Operating: 35 to 80% RH, no condensation Storage: 35 to 80% RH, no condensation
Vibration	Operating: 2.45 m/s max. Storage: 4.9 m/s max. Transportation: 14.7 m/s max.
Ambient gases	There must be no corrosive gases present.

2.1 Setting Operating Voltage and Operating Frequency

Connecting the user system interface board to the SH7046 series E6000H emulator enables emulation to be done using the user system operating voltage (Vcc: 3.0 to 3.6 V) Before determining the operating voltage and frequency of the user system, confirm the allowable range.

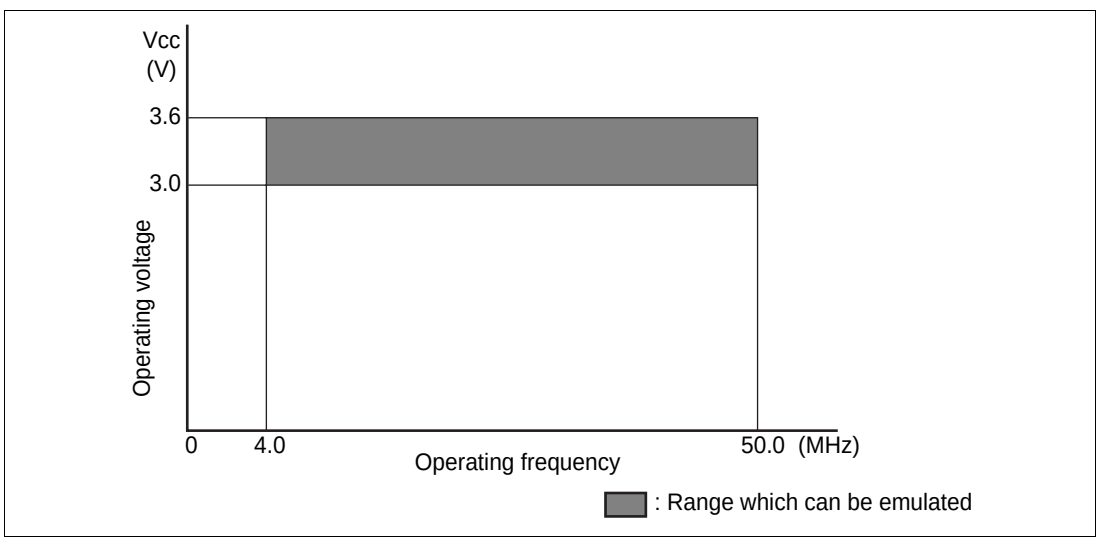


Figure 2 Allowable Operating Range

Section 3 Product Specifications

The specifications of this product are shown in table 3.

Table 3 Product Specifications

Item	Specifications
Target processor	SH7145F
Package	FP-144F
Function	Level limitation: This function keeps the output signal from 3-V emulator system equal to or less than power supply voltage of the user system (Vcc).
User-system operating conditions	Power supply voltage Vcc: 3.0 to 3.6 V A drop in the Vcc level of the user system is detected when the power supply voltage drops to 2.6 V or less.
Current consumption	Maximum of 100 mA.

Drop in Vcc Level Detection Function:

When the user system interface board is used, a drop is detected as follows:
When the power supply voltage (UVcc) of the user system is 2.6 V or less, the HEW will detect a Vcc drop. In this case, a sufficient voltage may not be supplied to the user system; ensure that the specified value of the power supply voltage is supplied.

Section 4 User Interface Specifications

The user system interface board incorporates a level conversion circuit supporting a low-voltage circuit. Accordingly, when connecting the user system to the emulator, pay attention to the signal delays and the number of FANINs and FANOUTs.

4.1 User System Interface Circuit

The user system interface circuit of the user system interface board is shown below.

(1) NMI and _RES

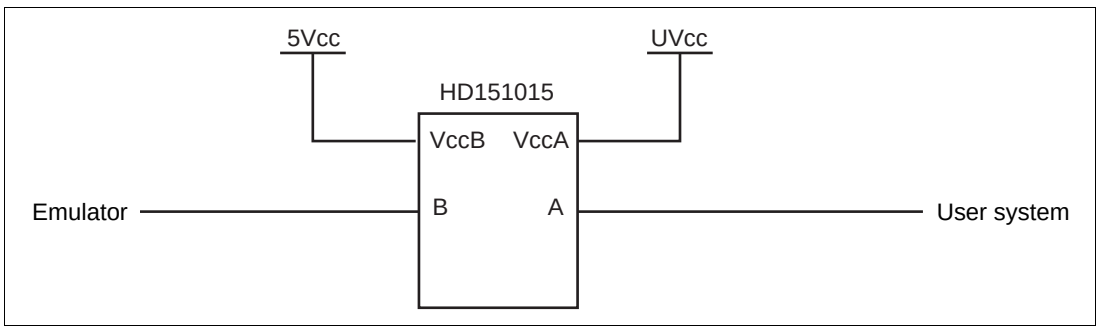


Figure 3 User System Interface Circuit for NMI and _RES

(2) PE15 to PE0, PC15 to PC0, PB9 to PB0, PA23 to PA0, and PD31 to PD0

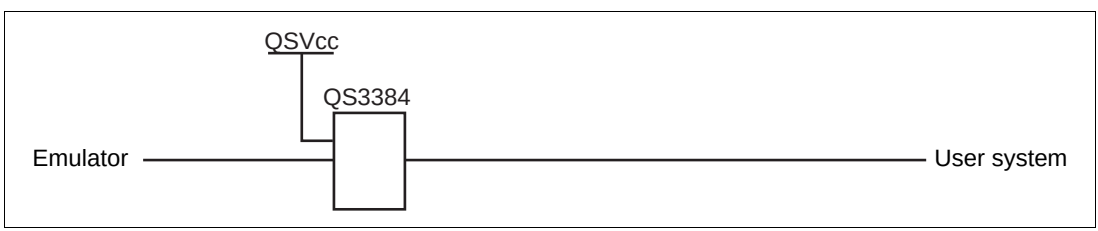


Figure 4 User System Interface Circuit for PE15 to PE0, PC15 to PC0, PB9 to PB0, PA23 to PA0, and PD31 toPD0

(3) AVcc, AVss, AN7 to AN0, and AVref

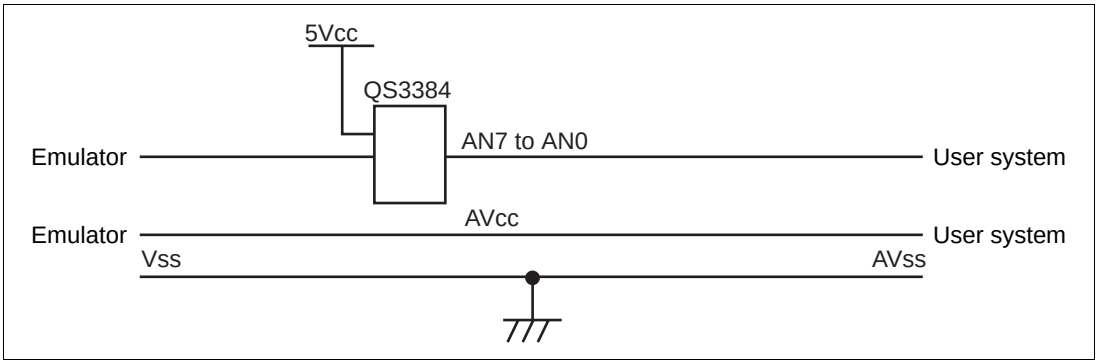


Figure 5 User System Interface Circuit for AVcc, AVss, AN7 to AN0, and AVref

(4) Other digital signals

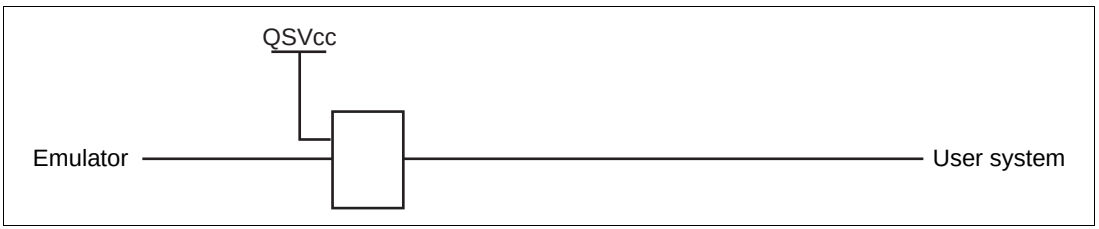


Figure 6 User System Interface Circuit for Other Digital Signals

(5) UVcc and UVss

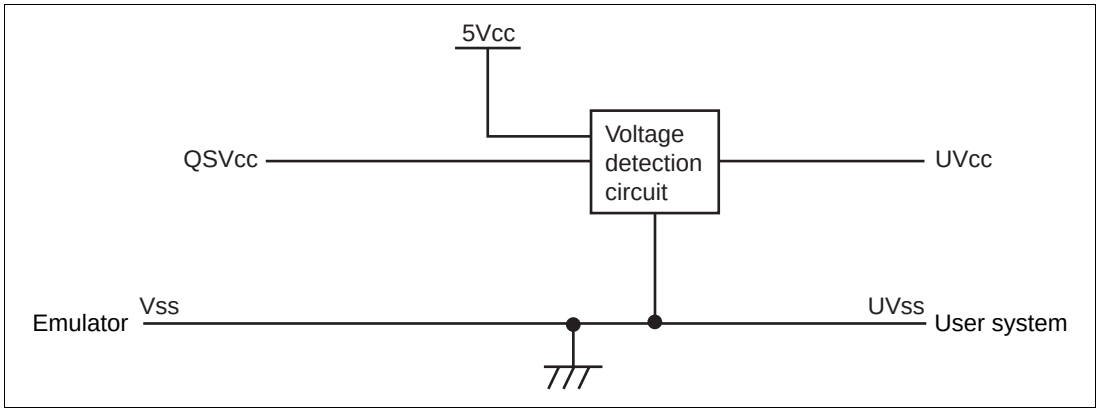


Figure 7 User System Interface Circuit for UVcc and UVss

Note: UVcc and UVss represent Vcc and Vss on a user system.
5Vcc and QSVcc represent Vcc generated in the user system interface cable.

Section 5 Connection Procedures

5.1 Connecting User System Interface Board to User System

⚠ WARNING

Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE BOARD is connected to or removed from any part. Before connecting, make sure that pin 1 on both sides are correctly aligned. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

To connect the cable head to the user system, follow the instructions below.

5.1.1 Installing IC Socket

Solder the IC socket for an FP-144F package to the user system.

CAUTION

Be sure to completely solder the leads so that the solder slops gently over the leads and forms solder fillets. (Use slightly more solder than the MCU.)

5.1.2 Installing Cable Head

CAUTION

Check the location of pin 1 before inserting.

Align pin 1 on the IC socket for an FP-144F package on the user system with pin 1 on the user system interface board, and insert the user system interface board into the IC socket on the user system, as shown in figure 8.

5.1.3 Fastening Cable Head

CAUTION

1. **Use a Phillip-type screwdriver whose head matches the screw head.**
2. **The tightening torque must be 0.054 N•m or less. If the applied torque cannot be accurately measured, stop tightening when the force required to turn the screw becomes significantly greater than that needed when first tightening. If a screw is tightened too much, the screw head may break or an IC socket contact error may be caused by a crack in the IC socket solder.**
3. **If the emulator does not operate correctly, cracks might have occurred in the solder. Check conduction with a tester and re-solder the IC socket if necessary.**

Fasten the user system interface board to the IC socket for an FP-144F package on the user system with the four screws (M2.0 x 10 mm) provided. Each screw should be tightened a little at a time, alternating between screws on opposing corners. Take special care, such as manually securing the IC socket soldered area, to prevent the soldered IC socket from being damaged by overtightening the screws or twisting the components.

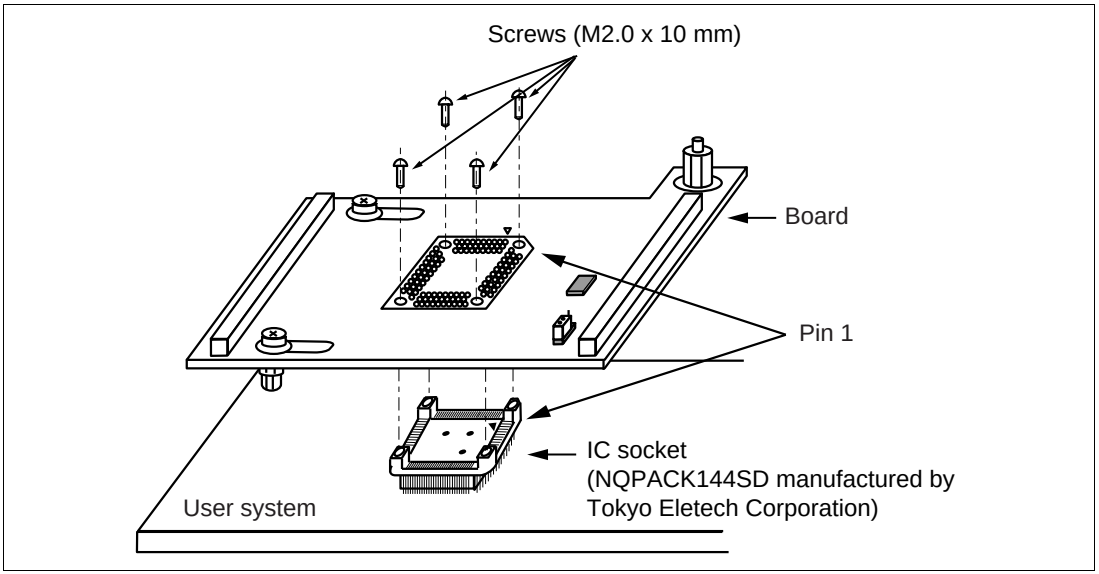


Figure 8 Connecting User System Interface Board to User System

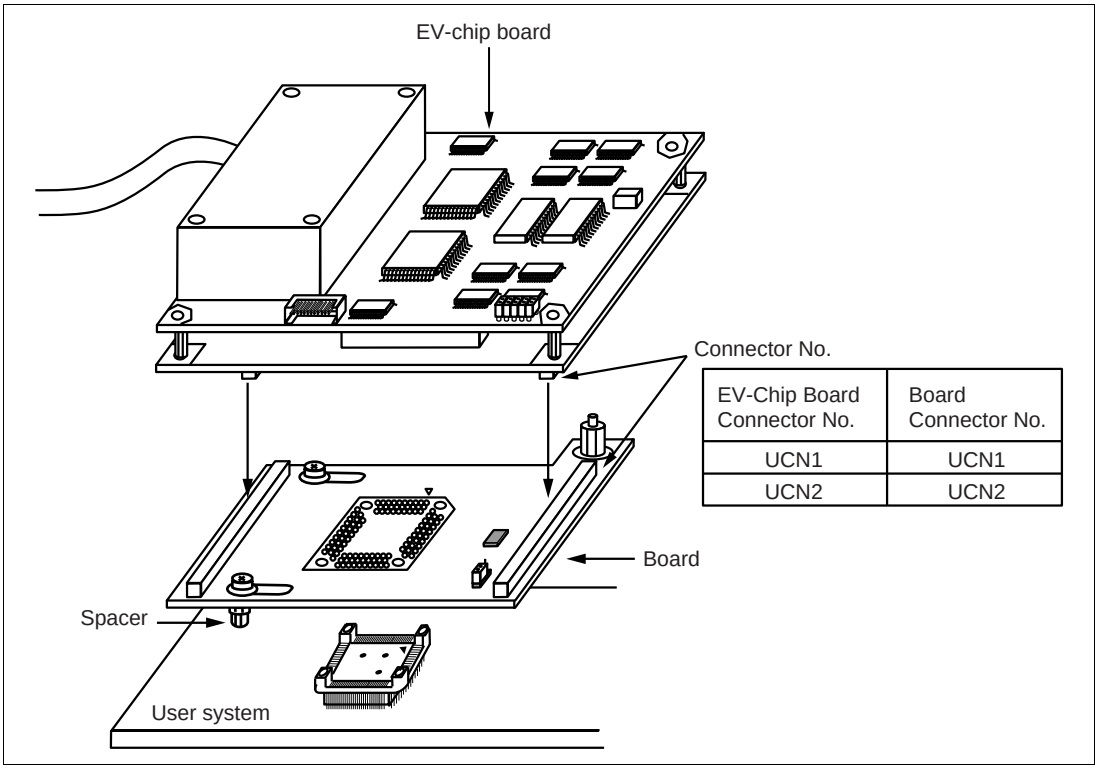
5.2 Connecting User System Interface Board to EV-Chip Board

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE BOARD is connected to or removed from any part. Before connecting, make sure that pin 1 on both sides are correctly aligned.**
2. **The user system interface board dedicated to the emulator must be used.**

1. Make sure the user system and emulator are turned off.
2. Align the connectors on the board with those on the EV-chip board according to their numbers (figure 9).
3. Adjust the height of the spacer attached to the board with the user system.



EV-Chip Board Connector No.	Board Connector No.
UCN1	UCN1
UCN2	UCN2

Figure 9 Connecting User System Interface Board to EV-Chip Board

5.3 Recommended Dimensions for User System Mount Pad (Footprint)

Figure 10 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for an FP-144F package (NQPACK144SD: manufactured by Tokyo Eletech Corporation). Note that the dimensions in figure 10 are somewhat different from those of the actual chip's mount pad.

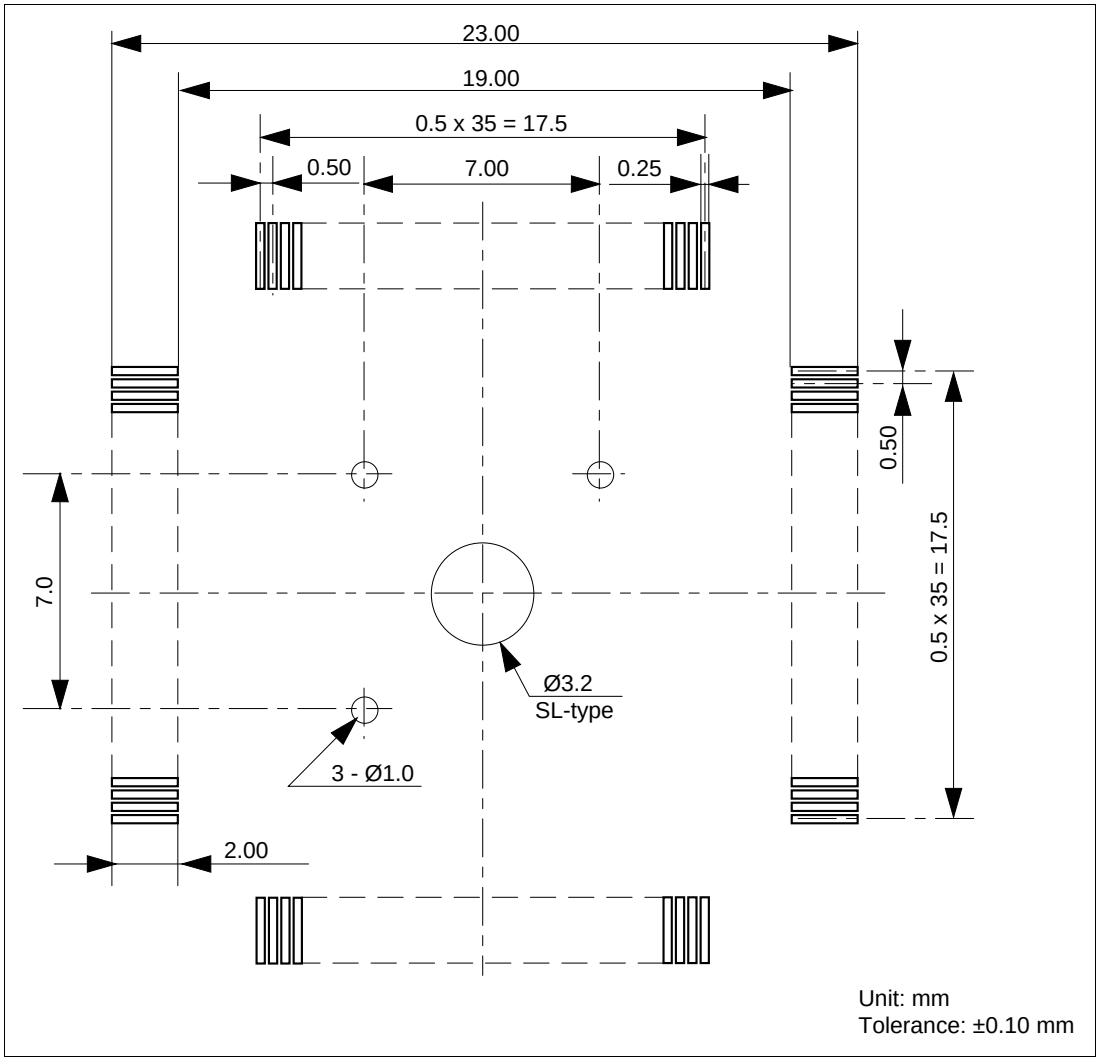


Figure 10 Recommended Dimensions for Mount Pad

5.4 Dimensions for EV-Chip Board and User System Interface Board

The dimensions for the EV-chip board and the user system interface board are shown in figure 11.

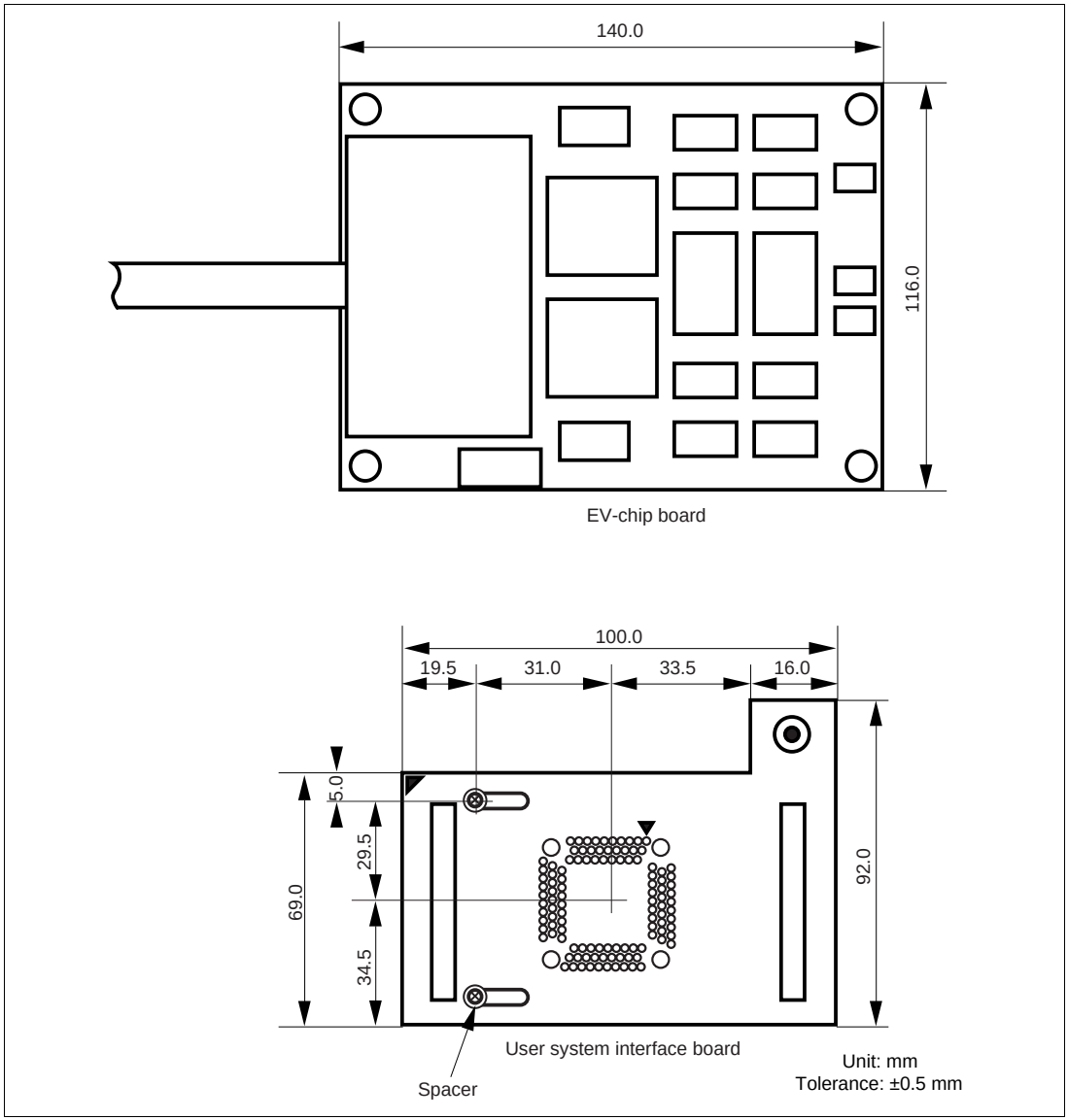


Figure 11 Dimensions for EV-Chip Board and User System Interface Board

5.5 Resulting Dimensions after Connecting User System Interface Board

The resulting dimensions, after connecting the user system interface board to the user system, are shown in figure 12.

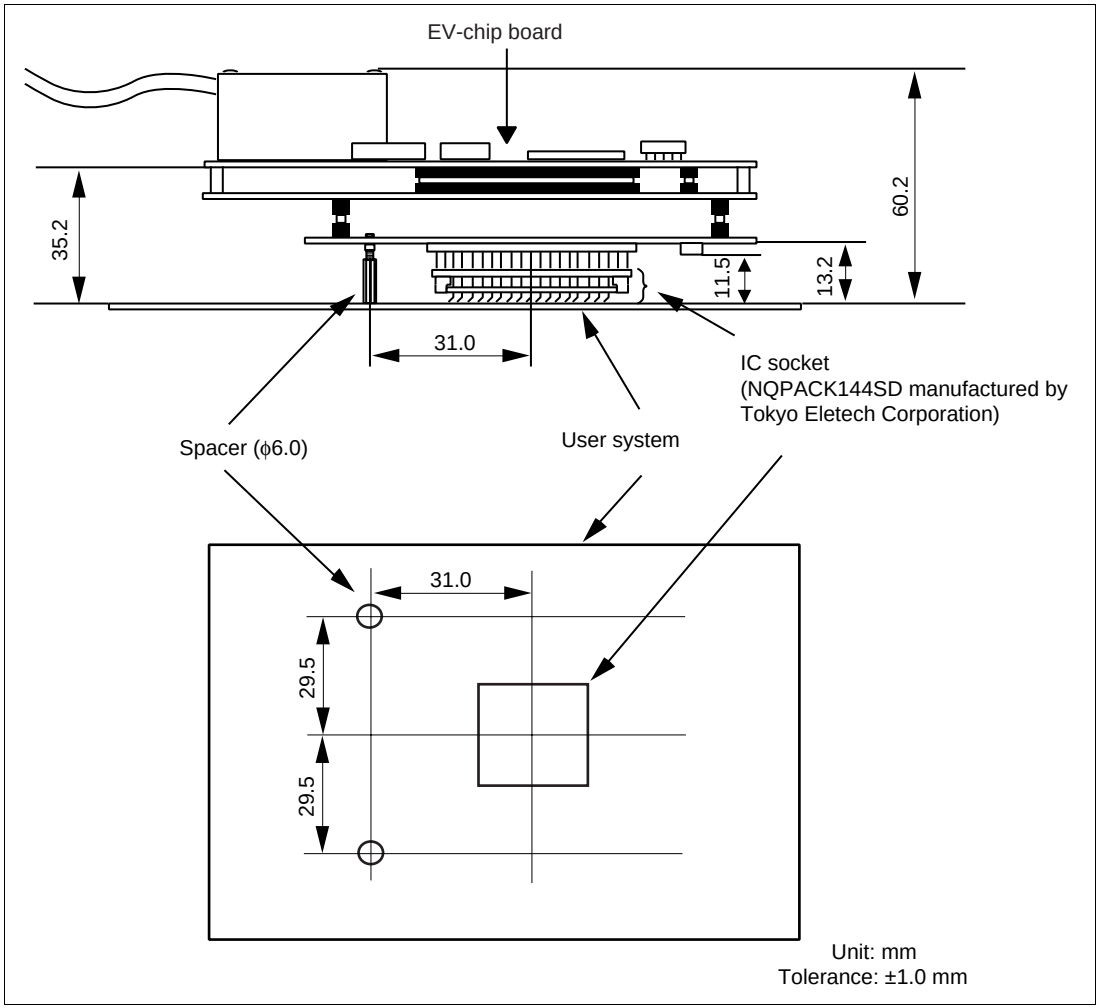


Figure 12 Resulting Dimensions after Connecting User System Interface Board

CAUTION

1. **Check the location of pin 1 before inserting.**
2. **Use a Philips-type screwdriver whose head matches the screw head.**
3. **The tightening torque must be 0.054 N•m or less. If the applied torque cannot be accurately measured, stop tightening when the force required to turn the screw becomes significantly greater than that needed when first tightening. If a screw is tightened too much, the screw head may break or an IC socket contact error may be caused by a crack in the IC socket solder.**
4. **If the MCU does not operate correctly, cracks might have occurred in the solder. Check conduction with a tester and re-solder the IC socket if necessary.**

Check the location of pin 1 before inserting the MCU into the IC socket on the user system, as shown in figure 13. After inserting the MCU, fasten the socket cover with the provided four screws (M2.0 x 6 mm). Take special care, such as manually securing the IC socket soldered area, to prevent the IC socket from being damaged by overtightening the screws or twisting the components.

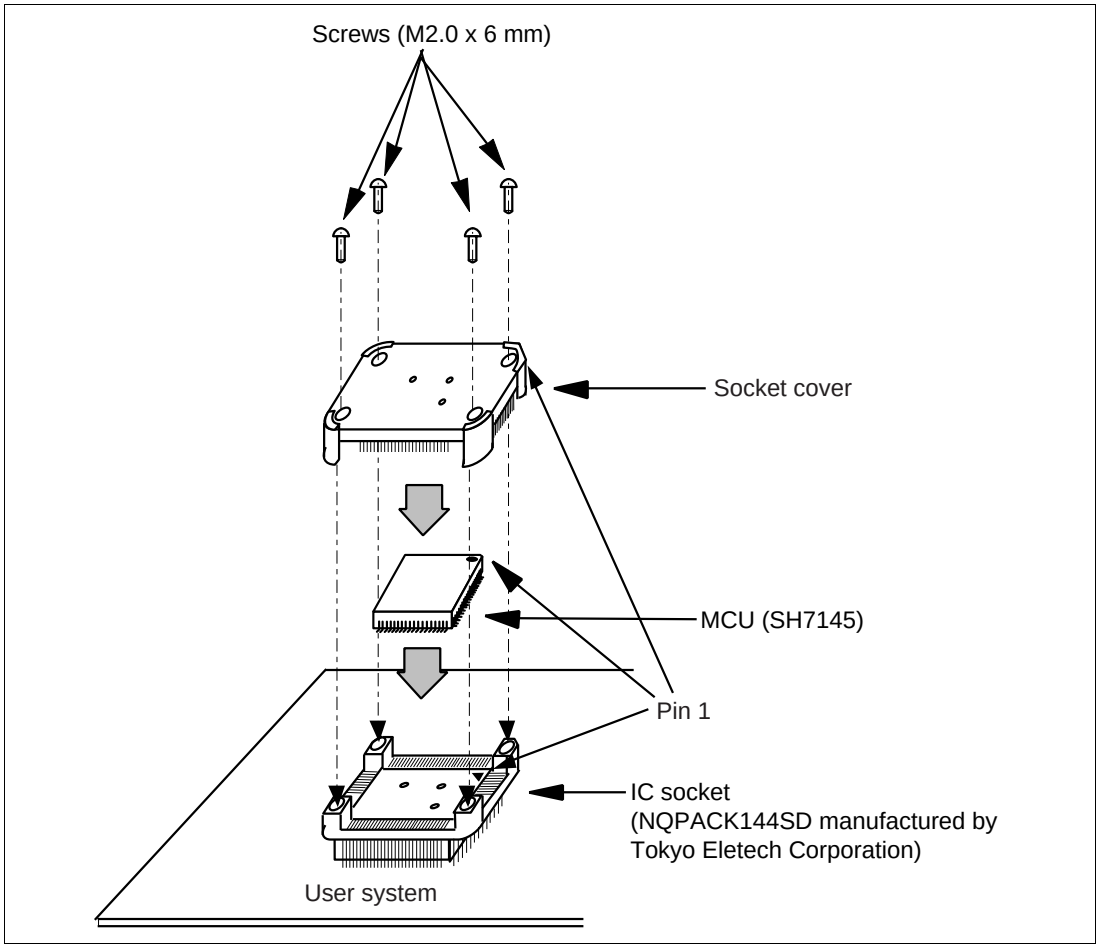


Figure 13 Installing MCU to User System

Section 7 Verifying Operation

1. Turn on the emulator according to the procedures described in the SH7046 E6000H Emulator User's Manual (HS7046EPH60HE).
2. Verify the user system interface cable connections by checking the pin states with the extended monitor and checking the bus states with the FILL command (emulator command). If an error is detected, recheck the soldered IC socket and the location of pin 1.
3. The emulator connected to this user system interface board supports three kinds of clock sources as the MCU clock. For details, refer to the SH7046 E6000H Emulator User's Manual (HS7046EPH60HE).
   - To use the emulator internal clock
     Select the clock in the emulator by the CLOCK command (emulator command).
   - To use the external clock on the user system
     Supply the external clock from the user system to the emulator by inputting the EXTAL pin (pin 96) on the user system interface board or connecting the crystal oscillator to the XTAL (pin 94) and EXTAL pins. For details, refer to section 4, Clock Pulse Generator, in the SH7144 Series Hardware Manual.
     Figure 14 shows the clock oscillator on the user system interface board.

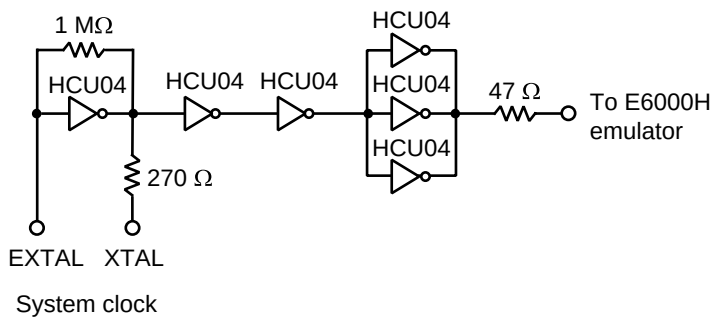


Figure 14 Clock Oscillator

— To use the crystal oscillator mounted on the EV-chip board
Install a crystal oscillator into the crystal oscillator terminals on the EV-chip board.

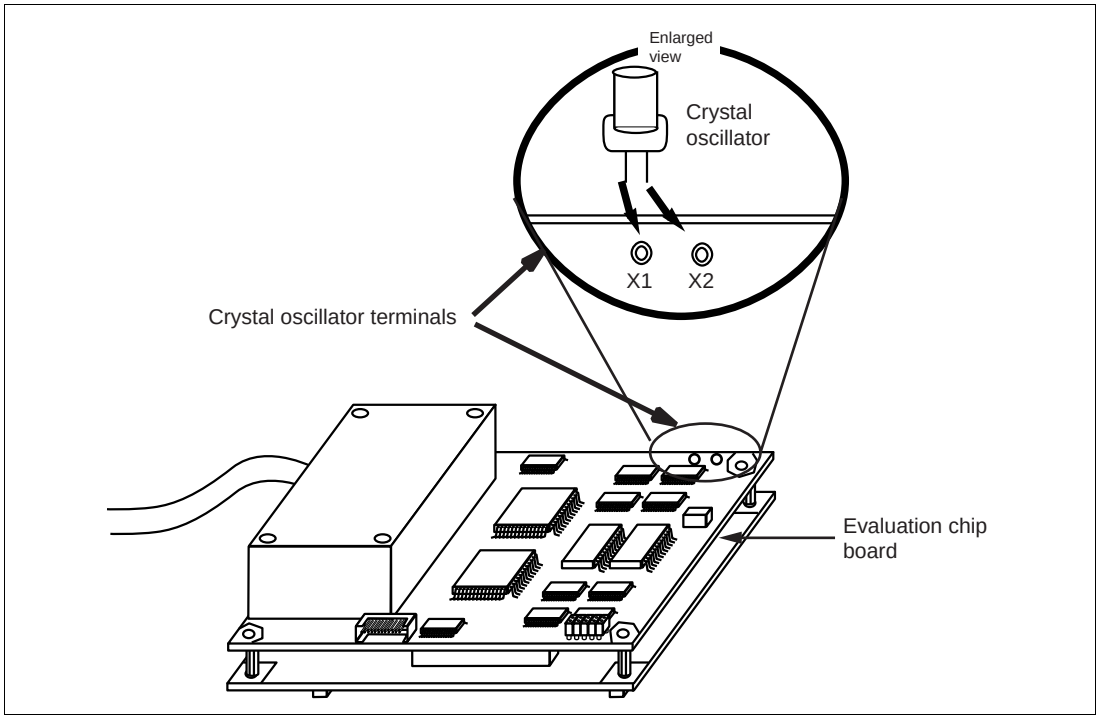


Figure 15 Installing the Clock Oscillator

Section 8 Notice

1. Before connecting any parts or cables, make sure that pin 1 on the both sides are correctly aligned.
2. Do not apply excessive force to the user system interface board while it is connected to the user system.
3. The dimensions of the recommended mount pad for the IC socket for this user system interface board are different from those of the MCU.
4. This user system interface board is specifically designed for the HS7046EPH60H emulator. Do not use this board with any other emulator.
5. When power is not supplied to the Vcc pin on the user system interface board, the emulator displays ** VCC DOWN. The emulator will not operate correctly.
6. The P1 short connector is used for testing. Do not remove the inserted jumper pin.

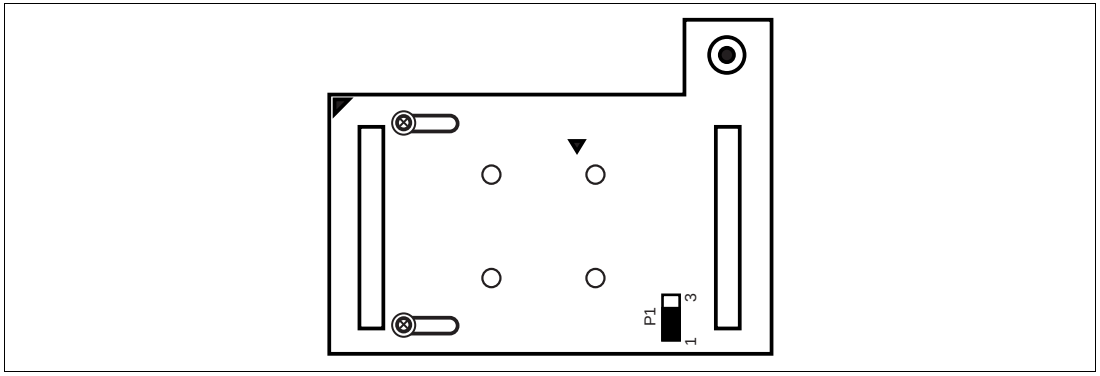


Figure 16 P1 Jumper Socket

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